

(12) **United States Patent**
Amrhein et al.

(10) **Patent No.:** **US 9,141,711 B2**
(45) **Date of Patent:** ***Sep. 22, 2015**

(54) **PERSISTING ANNOTATIONS WITHIN A COBROWSING SESSION**

(56) **References Cited**

U.S. PATENT DOCUMENTS

(75) Inventors: **Dustin K. Amrhein**, Cedar Park, TX (US); **Erik J. Burckart**, Raleigh, NC (US); **Andrew J. Ivory**, Wake Forest, NC (US); **Aaron K. Shook**, Raleigh, NC (US)

6,119,147	A *	9/2000	Toomey et al.	709/204
6,230,171	B1 *	5/2001	Pacifici et al.	715/201
6,687,878	B1 *	2/2004	Eintracht et al.	715/201
6,826,595	B1 *	11/2004	Barbash et al.	709/204
7,370,269	B1 *	5/2008	Prabhu et al.	715/230
8,010,901	B1 *	8/2011	Rogers	715/751
8,255,819	B2 *	8/2012	Chang et al.	715/769
8,788,584	B2 *	7/2014	Huxley	709/204
2001/0016872	A1 *	8/2001	Kusuda	709/205
2003/0103089	A1 *	6/2003	Ramani et al.	345/848
2004/0225716	A1 *	11/2004	Shamir et al.	709/204
2005/0033843	A1 *	2/2005	Shahi et al.	709/226
2009/0292618	A1	11/2009	Chatila	
2011/0289157	A1 *	11/2011	Pirnazar	709/206
2012/0209954	A1 *	8/2012	Wright	709/217

(73) Assignee: **INTERNATIONAL BUSINESS MACHINES CORPORATION**, Armonk, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 687 days.

This patent is subject to a terminal disclaimer.

FOREIGN PATENT DOCUMENTS

WO WO 02091193 A1 * 11/2002

OTHER PUBLICATIONS

Twiddla <http://www.twiddla.com>, as published in 2012.

(Continued)

(21) Appl. No.: **13/404,154**

(22) Filed: **Feb. 24, 2012**

(65) **Prior Publication Data**

US 2012/0159305 A1 Jun. 21, 2012

Related U.S. Application Data

(63) Continuation of application No. 12/913,367, filed on Oct. 27, 2010.

(51) **Int. Cl.**
G06F 17/24 (2006.01)
G06F 17/30 (2006.01)

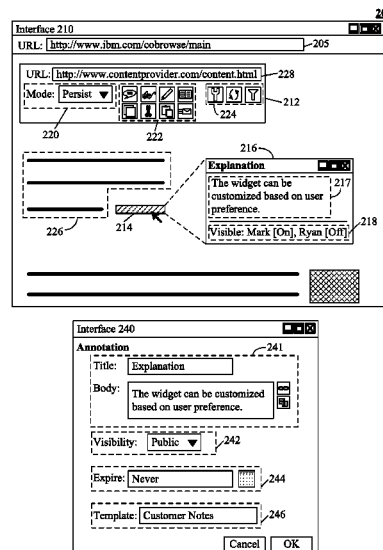
(52) **U.S. Cl.**
CPC **G06F 17/30873** (2013.01)

(58) **Field of Classification Search**
USPC 715/230
See application file for complete search history.

(57) **ABSTRACT**

A request to navigate to a Uniform Resource Identifier (URI) can be received within a cobrowsing session. The cobrowsing session can be associated with a unique session identifier of a cobrowsing application. The cobrowsing application can be part of a collaboration software. An annotation previously associated with the URI from a historic cobrowsing session can be retrieved. Content associated with the URI can be obtained and presented within an interface associated with the cobrowsing session. The annotation can be presented within the content associated with the URI of the interface.

20 Claims, 3 Drawing Sheets



(56)

References Cited

OTHER PUBLICATIONS

A Proxy-Based Infrastructure for Web Application Sharing and Remote Collaboration on Web Pages Richard Atterer, et al. Proceedings of the 11th IFIP TC 13 International Conference on Human-Computer Interaction; p. 74-87 Year of Publication: 2007.

Groupweb: A WWW Browser as Real Time Groupware Saul Greenberg, et al. Conference on Human Factors in Computing Systems; pp. 271-272 Year of Publication: 1996.

* cited by examiner

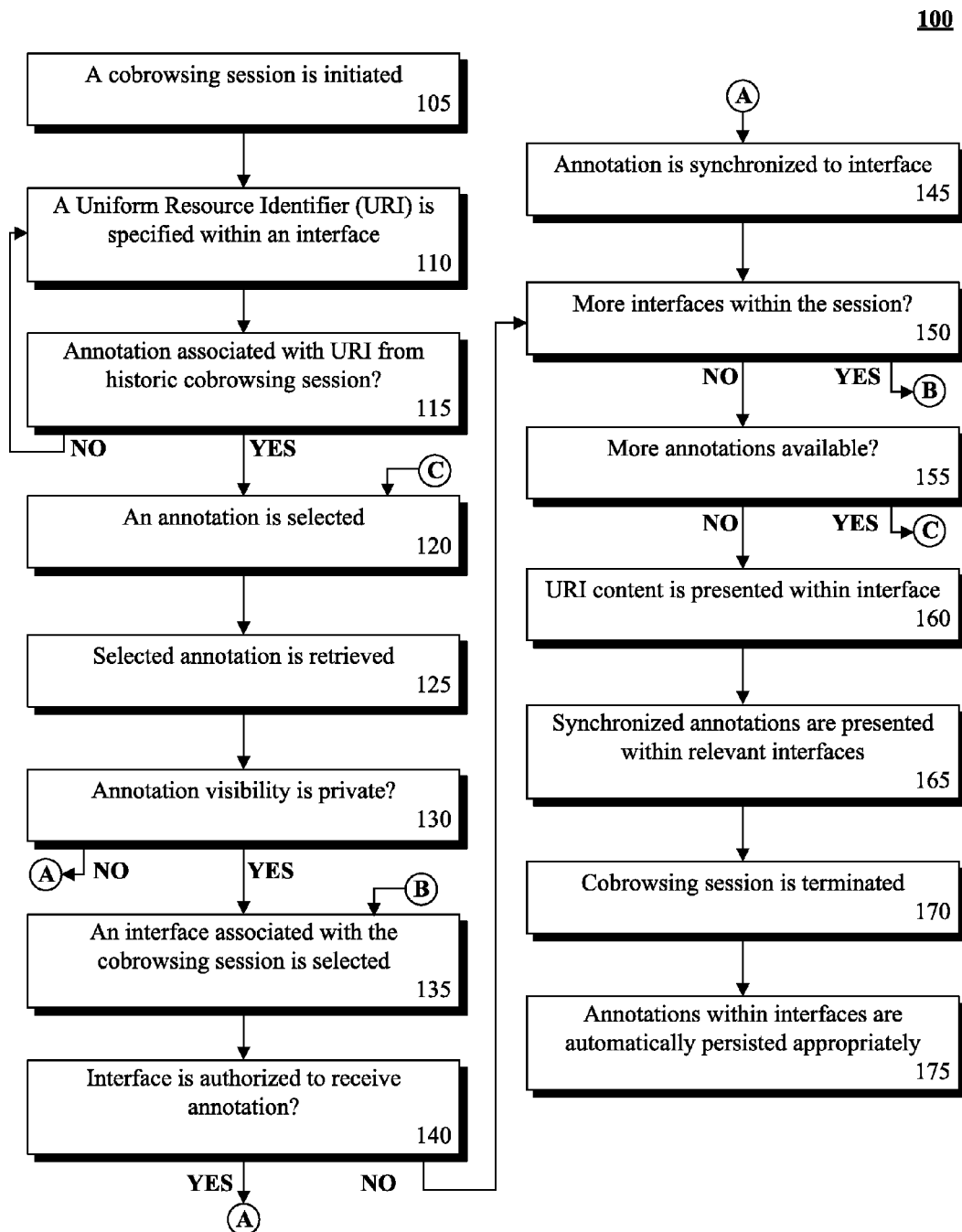
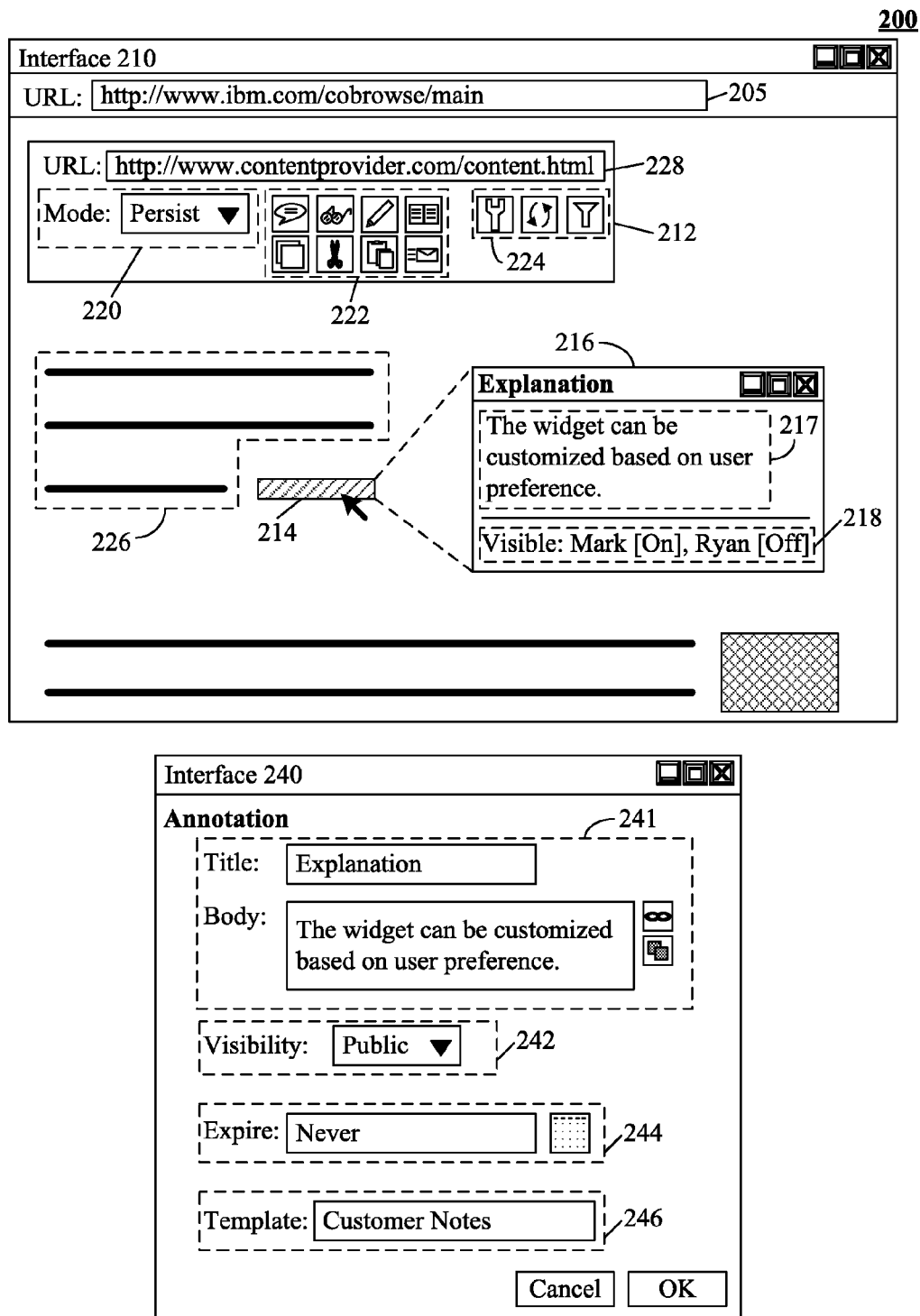


FIG. 1

**FIG. 2**

300

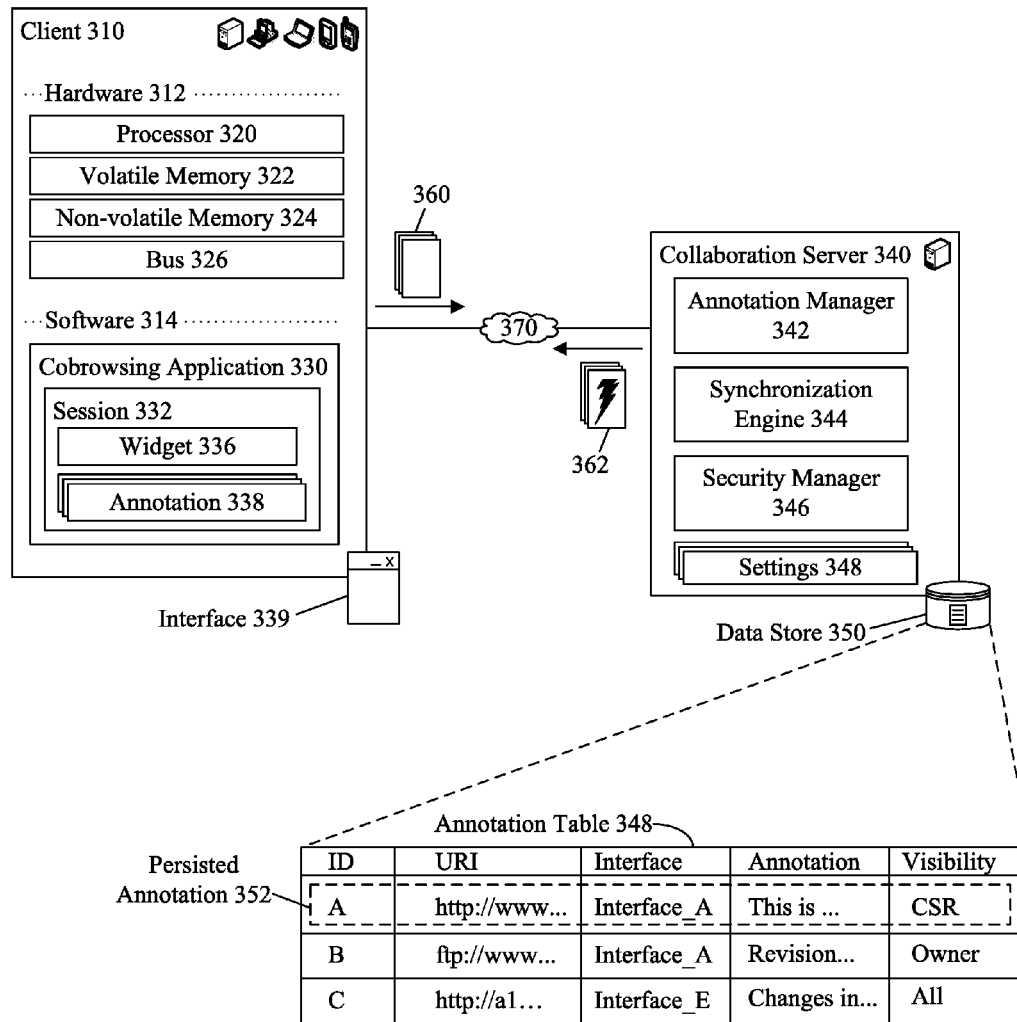


FIG. 3

1

PERSISTING ANNOTATIONS WITHIN A COBROWSING SESSION

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 12/913,367, filed Oct. 27, 2010 (pending), which is incorporated herein in its entirety.

BACKGROUND

The present invention relates to the field of collaboration software and, more particularly, to persisting annotations within a cobrowsing session.

Cobrowsing is becoming an increasingly important tool within the enterprise collaborative software domain. Cobrowsing can permit multiple users to joint navigate one or more Web resources (e.g., Web pages). That is, several users can view the same Web pages simultaneously while participating in a collaboration session. For example, users participating in a Web conference can be presented with a Web page which a moderator has selected based on a navigation action (e.g., selecting a hyperlink). These cobrowsing sessions are enabled typically through cobrowsing applications which can often take the form of Web applications and/or widgets which execute inside a Web browser. These applications are typically initiated from a special Uniform Resource Locator (URL) associated with the application. This URL initializes the application and permits synchronized navigation (e.g., cobrowsing) within the application to occur.

Traditional annotations are stored via associating the URL of a Web page with the annotation. This approach, however, fails when a cobrowsing session is initiated. Consequently, these annotations are lost when the cobrowsing session is terminated due to the mechanism in which the annotations are handled. Web page navigation is performed by the application and thus the browser URL remains unchanged regardless of the URL (e.g., Web page) requested within the cobrowsing session. That is, the browser reflects a URL of the cobrowsing application which is different from the URL managed by the application (e.g., the URL requested). Due to this mechanism, it is often difficult for cobrowsing applications to permit user created annotations to persist between sessions.

One mechanism is to store Web browser session data externally via third party tools by obtaining the URL of the Web browser. However, since the URL of the Web browser is the cobrowser application URL, the annotations cannot be extracted since application data is private to the application and cannot be accessed by third party tools readily. Further, this technique can be cumbersome and limited in its usability. Once exported from the cobrowsing session, the annotations can lose meaning because it has been removed from the context of the session (e.g., the Web page associated with it). For instance, when an annotation is extracted, the metadata and/or contextual information that it is associated with is not exported, leaving the annotation without a context which can erode the usability of the annotation. Further, this technique requires manual manipulation of annotations which can be a time consuming and error-prone process.

SUMMARY

A request to navigate to a Uniform Resource Identifier (URI) can be received within a cobrowsing session. The cobrowsing session can be associated with a unique session identifier of a cobrowsing application. The cobrowsing appli-

2

cation can be part of a collaboration software. An annotation previously associated with the URI from a historic cobrowsing session can be retrieved. Content associated with the URI can be obtained and rendered within an interface associated with the cobrowsing session. The annotation can be presented within the content associated with the URI of the interface.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

FIG. 1 is a flowchart illustrating a method for persisting annotations within a cobrowsing session in accordance with an embodiment of the inventive arrangements disclosed herein.

FIG. 2 is a schematic diagram illustrating a set of interfaces for persisting annotations within a cobrowsing session in accordance with an embodiment of the inventive arrangements disclosed herein.

FIG. 3 is a schematic diagram illustrating a system for persisting annotations within a cobrowsing session in accordance with an embodiment of the inventive arrangements disclosed herein.

DETAILED DESCRIPTION

The present disclosure is a solution for persisting annotations within a cobrowsing session. In the solution, annotations created within a cobrowsing session of a cobrowsing application can be automatically persisted natively. That is, annotations can be retrieved after the cobrowsing session is terminated and a new cobrowsing session is initiated. The annotation, associated with a Uniform Resource Identifier (URI), can be presented when the URI is requested and presented within a cobrowsing session. Permissions associated with the annotation can permit the annotation to be shared among participants of a cobrowsing session. For example, an annotation can be configured to be visible and editable to selected participants of a cobrowsing session.

As will be appreciated by one skilled in the art, aspects of the present invention may be embodied as a system, method or computer program product. Accordingly, aspects of the present invention may take the form of an entirely hardware embodiment, an entirely software embodiment (including firmware, resident software, micro-code, etc.) or an embodiment combining software and hardware aspects that may all generally be referred to herein as a "circuit," "module" or "system." Furthermore, aspects of the present invention may take the form of a computer program product embodied in one or more computer readable medium(s) having computer readable program code embodied thereon.

Any combination of one or more computer readable medium(s) may be utilized. The computer readable medium may be a computer readable signal medium or a computer readable storage medium. A computer readable storage medium may be, for example, but not limited to, an electronic, magnetic, optical, electromagnetic, infrared, or semiconductor system, apparatus, or device, or any suitable combination of the foregoing. More specific examples (a non-exhaustive list) of the computer readable storage medium would include the following: an electrical connection having one or more wires, a portable computer diskette, a hard disk, a random access memory (RAM), a read-only memory (ROM), an erasable programmable read-only memory (EPROM or Flash memory), an optical fiber, a portable compact disc read-only memory (CD-ROM), an optical storage device, a magnetic storage device, or any suitable combination of the foregoing. In the context of this document, a computer readable storage

medium may be any tangible medium that can contain, or store a program for use by or in connection with an instruction execution system, apparatus, or device.

A computer readable signal medium may include a propagated data signal with computer readable program code embodied therein, for example, in baseband or as part of a carrier wave. Such a propagated signal may take any of a variety of forms, including, but not limited to, electro-magnetic, optical, or any suitable combination thereof. A computer readable signal medium may be any computer readable medium that is not a computer readable storage medium and that can communicate, propagate, or transport a program for use by or in connection with an instruction execution system, apparatus, or device.

Program code embodied on a computer readable medium may be transmitted using any appropriate medium, including but not limited to wireless, wireline, optical fiber cable, RF, etc., or any suitable combination of the foregoing. Computer program code for carrying out operations for aspects of the present invention may be written in any combination of one or more programming languages, including an object oriented programming language such as Java, Smalltalk, C++ or the like and conventional procedural programming languages, such as the "C" programming language or similar programming languages. The program code may execute entirely on the user's computer, partly on the user's computer, as a stand-alone software package, partly on the user's computer and partly on a remote computer or entirely on the remote computer or server. In the latter scenario, the remote computer may be connected to the user's computer through any type of network, including a local area network (LAN) or a wide area network (WAN), or the connection may be made to an external computer (for example, through the Internet using an Internet Service Provider).

Aspects of the present invention are described below with reference to flowchart illustrations and/or block diagrams of methods, apparatus (systems) and computer program products according to embodiments of the invention. It will be understood that each block of the flowchart illustrations and/or block diagrams, and combinations of blocks in the flowchart illustrations and/or block diagrams, can be implemented by computer program instructions. These computer program instructions may be provided to a processor of a general purpose computer, special purpose computer, or other programmable data processing apparatus to produce a machine, such that the instructions, which execute via the processor of the computer or other programmable data processing apparatus, create means for implementing the functions/acts specified in the flowchart and/or block diagram block or blocks.

These computer program instructions may also be stored in a computer readable medium that can direct a computer, other programmable data processing apparatus, or other devices to function in a particular manner, such that the instructions stored in the computer readable medium produce an article of manufacture including instructions which implement the function/act specified in the flowchart and/or block diagram block or blocks.

The computer program instructions may also be loaded onto a computer, other programmable data processing apparatus, or other devices to cause a series of operational steps to be performed on the computer, other programmable apparatus or other devices to produce a computer implemented process such that the instructions which execute on the computer or other programmable apparatus provide processes for implementing the functions/acts specified in the flowchart and/or block diagram block or blocks.

FIG. 1 is a schematic diagram illustrating a method 100 for persisting annotations within a cobrowsing session in accordance with an embodiment of the inventive arrangements disclosed herein. In method 100, an annotation created within a cobrowsing session can be automatically persisted and synchronized to selected interfaces utilized by participants within the cobrowsing session. That is, an annotation can be permanently stored and accessed within a future cobrowsing session. During the cobrowsing session, annotations can be modified by participants and can be automatically synchronized permitting participants to view and/or modify the same annotation. In one instance, the method 100 can be performed in real-time, enabling dynamic persistent annotative actions to be achieved within a cobrowsing session.

As used herein, cobrowsing can be the joint navigation of two or more communicatively linked interfaces accessing a Web resource. Cobrowsing session include a semi-permanent interactive exchange between two or more interfaces participating in cobrowsing. An interface can refer to a user interface associated with a computing device and/or a participant. A participant can include, but is not limited to a user, a group of users, and the like utilizing an interface to interact within a cobrowsing session. Annotations can be presented within the interface which can include, but is not limited to, a Web browser, an application interface, and the like.

In step 105, a cobrowsing session is initiated. The cobrowsing session can be associated with a cobrowsing application including, but not limited to, desktop collaboration software, Web-based application, widget, and the like. In step 110, a Uniform Resource Identifier (URI) can be specified within an interface associated with the application. For example, a participant can manually input a Uniform Resource Locator (URL) within a Web browser to initiate a cobrowsing session. In step 115, if an annotation is associated with the URI from a historic cobrowsing session, the method can proceed to step 120, else return to step 110. In step 120, an annotation from a historic cobrowsing session is automatically selected.

In step 125, the selected annotation can be retrieved from a data source. The data source can include, but is not limited to, an application server, remote data store, local data store, and the like. In step 130, if the annotation visibility property is configured to private, the method can proceed to step 135, else continue to step 145. The visibility property can dictate which interfaces and consequently which participants can view an annotation. The visibility property can be configured based on user identity, groups, computing device identifiers, and the like. In step 135, an interface associated with the cobrowsing session can be selected. The interface can be associated with a cobrowsing application executing on a computing device utilized by a participant of the cobrowsing session. In step 140, if the interface (e.g., participant utilizing an interface) is authorized to receive the selected annotation, the method can proceed to step 145, else proceed to step 150. Authorization can include user credentials verified against a user group associated with the visibility property of the annotation. For example, if an annotation is configured for the group customer service representatives, only users of the group can be permitted to receive (e.g., view) the annotation.

In step 145, the selected annotation can be synchronized to the authorized interface. In step 150, if there are more interfaces within the session then the method can return to step 135, else continue to step 155. In step 155, if there are more annotations available, the method can return to step 120, else proceed to step 160. In step 160, the URI content (e.g., Web page) can be presented within the interface. In step 165, synchronized annotations can be presented within the relevant interfaces. In step 170, the cobrowsing session can be

terminated. In step 175, annotations within the interfaces can be automatically persisted appropriately upon session termination.

Drawings presented herein are for illustrative purposes only and should not be construed to limit the invention in any regard. Steps 120-155 can be performed continuously throughout the cobrowsing session enabling annotations to be used in real-time during the session. It should be understood when annotation visibility is public, the method can convey and/or synchronize annotations to each interface participating in the cobrowsing session (e.g., steps 145-155). It should also be appreciated that the cobrowsing session can be initiated via one or more automated and manual mechanisms.

FIG. 2 illustrates a set 200 of interfaces (210, 240) for persisting annotations within a cobrowsing session in accordance with an embodiment of the inventive arrangements disclosed herein. Interface 210, 240 can be present within the context of method 100 and system 300. Interface 210 can be a user interface associated with a collaboration software for interacting with annotations within a cobrowsing session. For instance, interface 210 can be a cobrowsing Web application (e.g., Uniform Resource Locator 205) executing within a Web browser. Interface 210 can present content 226 and annotation 217 associated with Uniform Resource Locator (URL) 228. Interface 240 can be a configuration screen permitting user specified settings to be applied to an annotation. In one embodiment, interface 240 can be a screen from a cobrowsing application.

In interface 210, annotation 217 can be presented within the cobrowsing application via an annotation frame 216. Annotation frame 216 can comprise of, but is not limited to, annotation title, annotation 216, visibility property 218, pagination controls, and the like. Annotation frame 216 can include frame controls including, but not limited to, minimize frame, maximize frame, hide frame, and the like. For example, annotation frame 216 can inherit interface properties from the cobrowsing application such as window controls. Annotation 217 can be presented within frame 216 based on user specified configuration, including, but not limited to, font size, font face, font family, font color, and the like. For instance, annotation frame 216 can include ruled lines which annotation 217 can be presented upon, mimicking a handwritten note.

In one instance, annotation 217 can be associated with media including, but not limited to, images, video, audio, and the like. In the instance, the associated media can be presented within frame 216. In another instance, annotation 217 can include Uniform Resource Identifiers (URIs), URLs, and the like. In the instance, additional resources can be linked to via a hyperlink presented within frame 216. It should be appreciated that annotation frame 216 can be optionally omitted based on configuration options permitting annotation 217 to be presented as a simple text overlay. In one embodiment, Cascading Style Sheet (CSS) can be utilized to overlay annotation 217 within content 226.

In one instance, annotation 217 can be presented within a customized graphic. In the instance, annotation 217 can be conformed to a handwritten note displayed within an adhesive note graphic. For example, annotation frame 216 can be a graphic of a yellow sticky note comprising of note 217 which can be positioned next to content 226.

In one embodiment, annotation 217 can be positionable permitting customizable location placement. In the embodiment, annotation 217 position can be tracked utilizing one or more traditional and/or proprietary mechanisms. In one instance, annotation 217 can be mapped to a Cartesian coord-

dinate system. Annotation position can include multiple position values utilized to present frame 216, placeholder 214, and the like.

In one embodiment, annotation placeholder 214 can be presented within interface 210 proximate to content 226 indicating an annotation 216 is associated with content 226. In the embodiment, placeholder 214 can be a graphic icon, text block, and the like. In one configuration of the embodiment, interface frame 216 can be dynamically presented upon interaction with placeholder 214. For example, when a mouse cursor hovers over placeholder 214, annotation 217 can be presented within annotation frame 216. In one instance, annotation 217 can be linked to other features including, but not limited to, highlight, underline, and the like. For example, an annotation can be linked to a highlighted portion of content 226.

In one embodiment, annotation toolbar 212 can be a component of a cobrowsing application and/or cobrowsing widget enabling persistent annotations to be utilized, customized, and/or managed. Annotation toolbar 212 can include, but is not limited to, mode identifier 220, functions 222, configuration options 224, and the like. In one instance, toolbar 212 can be an overlay (e.g., floating toolbar) which can be optionally presented based on application settings.

Visibility property 218 can be an automatically and/or manually established value for controlling the propagation of annotation 217. Visibility property 218 can be configured through toolbar 218, context menu settings, drop down menu options, and the like. In one embodiment, an annotation visibility setting can be presented within frame 216 indicating which participants can view the annotation and which participants cannot. For instance, an annotation 217 can be visible by a participant Mark, but hidden from participant Ryan.

Mode identifier 220 can be used to indicate and/or control the operational mode for annotations. Operational mode can include, but is not limited, session persistence, intra-session persistence, and the like. For instance, selection of session persistence can enable annotations to behave similar to traditional cobrowsing annotation, expiring after the session is terminated. Mode identifier 220 can be a drop-down selection box, radio dialog, and the like.

Functions 222 can permit management of annotations within interface 210. Functions 222 can include, but is not limited to annotation, creation, modification, history, copying, sharing features (e.g., email), and the like. In one instance, functions 222 can permit toggling visibility of annotations within interface 210. In another instance, functions 222 can permit access to annotation history. In the instance, annotation history can include, but is not limited to, session history, intra-session history, and the like.

Configuration options 224 can permit user-specific settings to affect annotation behavior and/or presentation. Options 224 can include, annotation options (e.g., interface 240), synchronization settings, filter settings, and the like. Annotation options can include, but is not limited to, visibility configuration, expiration settings, and the like. Synchronization settings can include, but is not limited to, prioritization settings, synchronization timing options, and the like. In one instance, synchronization settings can permit priority values to be associated with annotations to enable real-time resource allocation to be achieved. For instance, in scenarios where network bandwidth is limited, annotation priority can be configured to a low priority to permit cobrowsing navigation to take precedence. Filter settings can permit selective filtering of annotations based on one or more criteria including, but not limited to annotation, content, title, visibility property, color, and the

like. For example, a filter can be established to show only annotations from a specific user and/or group.

In interface **240**, annotation configuration can be customized based on user specific settings and/or system default settings. Interface **240** can comprise of annotation settings including, but not limited to, title, annotation, visibility property **242**, expiration setting **244**, template option **246**, and the like. In one instance, interface **240** can be a pop-up dialog which can permit dynamic and/or real-time configuration of an annotation within a cobrowsing session. In another instance, interface **240** can be a component of an administrative configuration interface associated with system **300**.

In section **241**, details of an annotation can be modified including, but not limited to, title, annotation text, media, URL, and the like. Section **241** can conform to traditional text editing fields such as a Hypertext Markup Language (HTML) text box. Customized tools can be integrated into section **241** including, but not limited to, a spell checker, dictionary, thesaurus, auto-completion, and the like.

In section **242**, the visibility property of an annotation can be easily configured. In one embodiment, the visibility property can be presented as a drop-down selection box, permitting user selection of available visibility settings. Visibility settings can include, but is not limited to, public, private, and the like. In one embodiment, visibility setting can be dynamically adjusted enabling real-time configuration of an annotation visibility. In one embodiment, visibility settings can permit an administrator (e.g., moderator) to tie annotations to particular users.

In section **244**, annotation expiration options can be configured based on one or more criteria. Options can include, but is not limited to, session expiration, intra-session expiration, timestamped expiration, and the like. In one embodiment, an annotation can be configured to persist indefinitely.

In section **246**, annotations can be derived from pre-defined templates which can enable rapid creation and customization. Section **246** can enable selection of a template which can automatically configure an annotation based on template settings. Template settings can include, but is not limited to, title, annotation, visibility, expiration, and the like. For example, a template for customer specific notes can be established to allow a customer service representative to rapidly create customer specific notes during a cobrowsing session.

Drawings presented herein are for illustrative purposes only and should not be construed to limit the invention in any regard. Functionality of interface **210**, **240** described herein can be encapsulated within a drop-down menu, context menu, and the like. Interface **210**, **240** elements can include, but is not limited to, checkboxes, radio dialogs, drop-down selection boxes, text box, text areas, and the like. In one instance, interface **210**, **240** can be a screen from a desktop cobrowsing application. In one embodiment, annotation **217** can support redaction capabilities. For example, a user within a cobrowsing session can redact one or more portions of an annotation in real-time. In one instance, free form annotations and/or hand drawn annotations can be supported within interface **210**. It should be appreciated that functionality described herein can be a portion of a DOJO toolkit permitting rapid development and modification of interface **210**, **240** features.

As used herein, content **226** can include, but is not limited to, Web-based content, Web application content, document content, and the like. It should be understood that content **226** can remain unmodified by annotation **217**.

FIG. 3 is a schematic diagram illustrating a system **300** for persisting annotations within a cobrowsing session in accordance with an embodiment of the inventive arrangements disclosed herein. System **300** can be present in the context of

method **100**. In system **300**, a collaboration server **340** can permit annotations to persist between cobrowsing sessions utilizing session data (e.g., annotation table **348**). System **300** components can be communicatively linked via network **370**. In one embodiment, server **340** can be a component of a Service Oriented Architecture (SOA).

In system **300**, a cobrowsing application **330** can be associated with an interface **339**. Interface **339** can be a user interface including, but not limited to, graphical user interface, text interface, mixed-mode interface, and the like. For example, interface **339** can be a dynamically generated Rich Internet Application (RIA) interface.

Annotation table **348** can be a portion of a cobrowsing session **332** metadata stored within data store **350**. Table **348** can be utilized to track annotation **338** which can store annotation **338** as persisted annotation **352**. Table **348** can be a portion of a database including, but not limited to, Relation Database Management System (RDBMS), Object Oriented Database Management System (OODBMS), and the like. It should be appreciated, table **348** can be stored within a network attached storage (NAS) element, storage attached network (SAN), client **310**, and the like.

Persisted annotation **352** can be an instance of annotation **338** which can be stored within table **348**. Persisted annotation **352** can comprise of, but is not limited to, annotation identifier, Unified Resource Identifier (URI), interface identifier, annotation, visibility property, expiration value, and the like. Persisted annotation **352** can be communicated to application **330** upon initiation of session **332**. Upon termination of session **332**, annotation **338** can be conveyed to server **340** which can store the annotation **338** within table **348**. In one embodiment, changes to annotation **338** can overwrite persisted annotation **352**. In another embodiment, changes to annotation **338** can be stored separately from persisted annotation **352** enabling a change history to be cataloged. In one configuration of the embodiment, changes can be stored as deltas of the original annotation **352**.

Widget **336** can be a Web-based application able to execute within application **330**. For example, widget **336** can be an IBM IWIDGET. Annotation **338** can be a user specified note presented within cobrowsing application which can be manipulated via widget **336**. In one embodiment, widget **336** can be utilized to manage every annotation within session **332**. In another embodiment, multiple instances of widget **336** can be executed to manage each annotation within session **332**. In yet another instance, widget **336** can be an optional component.

Cobrowsing application **330** can be a software entity permitting annotated cobrowsing within session **332** to occur. Cobrowsing application **330** can be used to initiate, manage, and terminate session **332**. For instance, cobrowsing application **330** can be a Web browser able to navigate to a Uniform Resource Locator (URL) associated with a collaboration application. Application **330** technology can include, but is not limited to, JAVA 2 ENTERPRISE EDITION (J2EE), Javascript, Hypertext Markup Language (HTML), Extensible Markup Language (XML), and the like.

Session **332** can be initiated through user interaction within interface **339**. In one instance, session **332** can be initiated from a cobrowsing invitation presented within interface **339**. In another instance, session **332** can be automatically instantiated when application **330** is executed. Session **332** can comprise of widget **336**, annotation **338**, and like. It should be appreciated that session **332** can be stateful, stateless, and the like.

Collaboration server **340** can be a hardware/software entity permitting annotations within a cobrowsing session to be

persisted. Server **340** can include, but is not limited to, annotation manager **342**, synchronization engine **344**, security handler **346**, settings **348**, data store **350**, and the like. Server **340** can be associated with additional server and/or services to enable system **300** functionality. For example, server **340** can be associated with a network time protocol (NTP) service enabling accurate timing to be maintained for synchronization processes within system **300**. In one embodiment, server **340** can be a component of a proxy server (e.g., Hypertext Transport Protocol proxy).

Annotation manager **342** can be a hardware/software component for handling annotations within a cobrowsing session **332**. Manager **342** can provide annotation functionality associated with application **330**. Manager **342** can be used to create, modify, and/or delete annotations within a cobrowsing session. In one instance, manager **342** can utilize unique annotation identifiers to manipulate annotations. In the instance, each annotation can be associated with a unique identifier enabling each annotation to be accessed independently of a cobrowsing session. In one embodiment, manager **342** can expose an application programming interface (API) enabling widget **336** to perform annotative functions. That is, service side functionality can be exposed to client side interfaces. In one instance, manager **342** functionality can be encapsulated within a portion of interface **339** and/or widget **336**. For example, manager **342** can be a portion of a client side widget **339**. Annotation event **360** can be received by annotation manager **342** which can process event **360** based on event type.

Synchronization engine **344** can be a hardware/software component permitting synchronization of annotation **338** for each application **330** participating in a cobrowsing session. Synchronization engine **344** can permit synchronous and asynchronous modes of execution based on settings **348**. Engine **344** can respond to annotation event **360** which can trigger a synchronization event **362** to occur. In one instance, synchronization engine **344** can utilize annotation identifiers to determine relevant annotations **338** which require synchronization.

Annotation event **360** can be a user triggered generated event based on user interaction with application **330** and/or widget **336**. Event **360** can be distinguished by event types which can include, but is not limited to, annotation creation, annotation modification, annotation deletion, annotation synchronization, and the like. In one instance, event **360** can be a custom event defined within settings **348** permitting robust customization to be achieved. For example, event **360** can be a specialized batch processing command allowing easy manipulation of numerous annotations.

Synchronization event **362** can be a programmatically generated event enabling harmonizing of annotation **338** within session **332**. Event **362** can trigger synchronization of one or more annotations within session **332**. Event **362** can include, but is not limited to, annotation content, annotation settings, and the like. Event **362** can be conveyed to widget **336** which can present synchronized content of annotation **338**. In one instance, event **362** can be manually triggered via a user initiated event (e.g., synchronization command).

Security manager **346** can be a hardware/software component for handler annotation visibility within session **332**. Manager **346** functionality can include, but is not limited to, authentication, validation, login management, and the like. Manager **346** can be utilized to escalate and/or demote annotation visibility privileges. Manager **346** can be communicatively linked to services which can be used to authenticate and/or validate interface authorization. In one instance, a directory service can be utilized to identify a user and deter-

mine user privileges for an interface associated with session **332**. In another instance, third party authentication mechanisms can be communicatively linked to provide extensible security functionality. For instance, manager **346** can be integrated with an OPENID authentication framework permitting users to utilize existing digital identities.

Settings **348** can be one or more configuration parameters for establishing the behavior of server **340**. Settings **348** can include, but is not limited to, synchronization settings, annotation specific settings, security settings (e.g., visibility controls), administrative settings, and the like. Settings **348** can be accessible through one or more interfaces including, but not limited to, interface **339**, interface **240**, and the like. Settings **348** can permit customization of persisted annotation including, client-side settings, server-side settings, and the like.

Client **310** can be a hardware/software entity able to execute cobrowsing application **330**. Client **310** can include, but is not limited to, hardware **312**, software **314**, and the like. Client **310** can be, but is not limited to, desktop computer, laptop computer, mobile phone, portable computing device, tablet computing device, portable digital assistant (PDA), and the like. Hardware **312** can be one or more physical component comprising of processor **320**, volatile memory **322**, non-volatile memory **324**, bus **326**, and the like. Software **314** can comprise of cobrowsing application **330**, an operating system (not shown), and the like.

Drawings presented herein are for illustrative purposes only and should not be construed to limit the invention in any regard. System **300** can be a component of a distributed computing system, networked computing environment, cloud computing system, and the like. Network **370** can include, but is not limited to, public network, private network, Virtual Private Network (VPN), and the like. It should be appreciated system **300** can be integrated within an existing collaboration infrastructure enabling functionality of traditional collaboration software to be easily extended.

System **300** architecture can include, but is not limited to, publish/subscribe, event driven, and the like. In one embodiment, system **300** can employ a Representational State Transfer Architecture (REST). In one instance, system **300** can be a component of a Service Oriented Architecture. It should be noted that system **300** can function in real-time and/or near real-time. In one instance, system **300** can utilize a real-time protocol to achieve real-time functionality. In the instance, system **300** can include, but is not limited to, Real-Time Transport Protocol (RTP), Session Initiated Protocol (SIP), Transport Control Protocol/Internet Protocol (TCP/IP), and the like. For example, annotation features of system **300** can be associated with a telephony collaboration application.

It should be appreciated system **300** can support annotation **338** locking enabling granular control over annotation properties. In one instance, annotation **338** position can be locked disallowing movement of annotations within interface **339**.

In one instance, annotation **338** can be cached within client **310** prior to synchronization to compensate for communication outages. In the instance, memory **322**, **324** can be employed to temporarily store annotation **338** which can be conveyed to relevant interfaces when client **310** is communicatively linked to server **340**.

It should be appreciated; manager **346** can permit traditional and/or proprietary security mechanisms to be utilized within system **300**. Further, system **300** can be associated with multiple security mechanisms including, but not limited to, Public Key Infrastructure (PKI), private key encryption, and the like.

11

In one embodiment, server 340 can be a component of an IBM WEBSHERE software/middleware. In the embodiment, server 340 can be a functionality of an IBM COMMUNICATIONS ENABLED APPLICATIONS software.

The flowchart and block diagrams in the FIGS. 1-3 illustrate the architecture, functionality, and operation of possible implementations of systems, methods and computer program products according to various embodiments of the present invention. In this regard, each block in the flowchart or block diagrams may represent a module, segment, or portion of code, which comprises one or more executable instructions for implementing the specified logical function(s). It should also be noted that, in some alternative implementations, the functions noted in the block may occur out of the order noted in the figures. For example, two blocks shown in succession may, in fact, be executed substantially concurrently, or the blocks may sometimes be executed in the reverse order, depending upon the functionality involved. It will also be noted that each block of the block diagrams and/or flowchart illustration, and combinations of blocks in the block diagrams and/or flowchart illustration, can be implemented by special purpose hardware-based systems that perform the specified functions or acts, or combinations of special purpose hardware and computer instructions.

What is claimed is:

1. A method for persisting cobrowsing annotations amongst a plurality of cobrowsing sessions, wherein each of the cobrowsing sessions permit a plurality of users to jointly navigate to a Uniform Resource Identifier (URI), the plurality of cobrowsing sessions comprise a first cobrowsing session and a subsequent cobrowsing session, the method comprising:

receiving a request to navigate to the Uniform Resource Identifier (URI) within the subsequent cobrowsing session wherein each of the first and the subsequent cobrowsing sessions is associated with a unique session identifier, wherein each of the first and the subsequent cobrowsing sessions is associated with a cobrowsing application, wherein the cobrowsing application is a portion of a collaboration software;

automatically retrieving a cobrowsing annotation that was automatically persisted when the first cobrowsing session was terminated, wherein the cobrowsing annotation was previously associated with the URI from the first cobrowsing session that is a historic cobrowsing session; obtaining content associated with the URI and presenting the obtained content on a plurality of interfaces associated with the subsequent cobrowsing session; and automatically presenting the cobrowsing annotation within the content associated with the URI on at least one interface amongst the plurality of interfaces associated with the subsequent cobrowsing session.

2. The method of claim 1, further comprising:

receiving an additional cobrowsing annotation associated with the URI within the subsequent cobrowsing session; and

storing the additional cobrowsing annotation associated with the URI, wherein the stored additional cobrowsing annotation is automatically retrievable in future cobrowsing sessions.

3. The method of claim 1, wherein the cobrowsing annotation is associated with session data of the subsequent cobrowsing session.

4. The method of claim 1, wherein the cobrowsing annotation is associated with a visibility property, wherein the visibility property establishes authorized interfaces permitted to receive the annotation.

12

5. The method of claim 4, wherein the visibility property is configurable by a user.

6. The method of claim 1, wherein the cobrowsing annotation is associated with an expiration value, wherein the expiration value determines the lifespan of the annotation, wherein the lifespan is at least one of a cobrowsing session, a quantity of cobrowsing sessions, and a temporal value.

7. The method of claim 1, wherein the collaboration software is a widget associated with a software suite.

8. The method of claim 1, wherein the presenting is an overlay occurring within a Web browser, wherein the overlay is a CASCADING SYTLE SHEET (CSS) layer.

9. The method of claim 1, wherein the cobrowsing annotation is associated with a positioning value, wherein the positioning value is coordinate pair of a Cartesian coordinate system.

10. The method of claim 1, wherein the annotation is associated with a Hypertext Markup Language (HTML) element of the content associated with the URI.

11. The method of claim 1, wherein the annotation is associated with a priority value for real-time resource allocation.

12. The method of claim 1, further comprising:

receiving, from a user, a selection of an operational mode for the cobrowsing annotation, wherein the operation mode comprises one of a session persistence of the cobrowsing annotation, and an intra-session persistence of the cobrowsing annotation; and

storing the cobrowsing annotation based on the selection.

13. The method of claim 1, further comprising maintaining an annotation history for the cobrowsing annotation, wherein the annotation history comprises at least one of a session history and an intra-session history associated with the cobrowsing annotation.

14. The method of claim 1, further comprising maintaining a change history for the cobrowsing annotation, wherein the change history is indicative of changes made to the cobrowsing annotation.

15. A method for persisting cobrowsing annotations amongst a plurality of cobrowsing sessions, wherein each of the cobrowsing sessions permit a plurality of users to jointly navigate to a Uniform Resource Identifier (URI), the method comprising:

automatically receiving, in a subsequent cobrowsing session, a cobrowsing annotation created by a user during a first cobrowsing session, wherein the cobrowsing annotation was automatically persisted when the first cobrowsing session was terminated,

assigning a unique annotation identifier to the cobrowsing annotation for identifying the annotation independently of the subsequent cobrowsing session; and

automatically storing the cobrowsing annotation upon termination of the subsequent cobrowsing session, wherein the stored cobrowsing annotation is automatically retrievable, based on the unique annotation identifier, for manipulations in a future cobrowsing sessions involving the user and the URI.

16. The method of claim 15, further comprising:

automatically obtaining the cobrowsing annotation in the subsequent cobrowsing session persisted from the first cobrowsing session; and

automatically synchronizing the cobrowsing annotation across a plurality of interfaces associated with the subsequent cobrowsing session.

17. The method of claim 15, further comprising maintaining a change history for the cobrowsing annotation, wherein the change history is indicative of changes made to the cobrowsing annotation.

18. A method for persisting cobrowsing annotations amongst a plurality of cobrowsing sessions, the method comprising:

initiating a subsequent cobrowsing session upon receiving a request to navigate to a Uniform Resource Identifier (URI) associated with a cobrowsing application, wherein the subsequent cobrowsing session permits a plurality of users using a plurality of interfaces to jointly navigate to the URI;

automatically retrieving a persisted annotation from a first cobrowsing session that was automatically persisted upon termination of the first cobrowsing session wherein the first cobrowsing session was a session involving the URI and wherein the cobrowsing annotation is associated with the URI;

obtaining content associated with the URI;

determining one or more authorized interfaces amongst the plurality of interfaces for the subsequent cobrowsing session; and

automatically presenting the cobrowsing annotation, persisted from the first cobrowsing session as well as the content within the authorized interfaces during the subsequent cobrowsing session, wherein the cobrowsing annotation is presented proximate to the content.

19. The method of claim **18**, wherein the determining comprises validating identity of each of the plurality of interfaces associated with the subsequent cobrowsing session.

20. The method of claim **18**, wherein the determining comprises identifying user privileges for each of the plurality of interfaces associated with the subsequent cobrowsing session.

* * * * *